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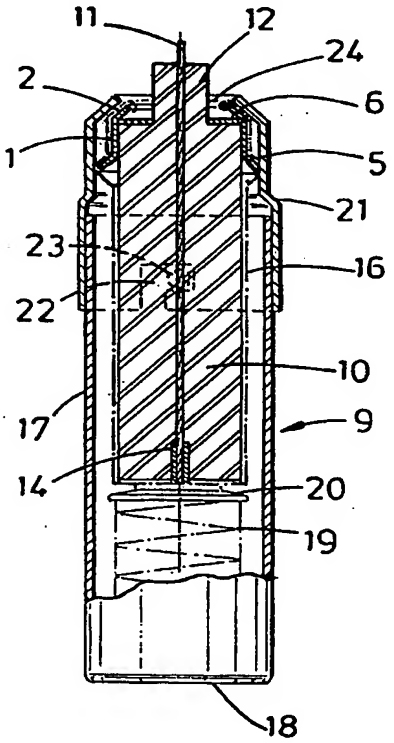
(54) Title: CANDLES

(57) Abstract

A cap for a candle adapted for use in combination with a spring loaded candle cartridge (9). The candle cap comprises a generally cylindrical body (1,2) defining top and bottom apertures (3, 4). An internal annular flange (6) extends radially inwards of the body (1, 2) between the top and bottom apertures (3, 4). The cap is dimensioned relative to a candle (8) with which it is intended to be used so that in use the cap may be fitted over the top of the candle (8) such that the annular flange sits on a top surface of the candle with the wick (11) extending through the annular flange (6).



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CANDLES

The present invention relates to candles, particularly candles for use in spring loaded candle cartridges.

Candles which burn in spring loaded cartridges are known. Such cartridges generally comprise a tubular body which houses a spring biased platform and has an aperture at its upper end. In use a candle is seated on the platform and is thereby forced upward so that the upper end of the candle and wick it supports extend through the aperture. The aperture has a smaller diameter than the candle so that the candle is not forced through the aperture. As the candle burns it is continuously pushed upwards so that the burning portion of the wick always extends through the aperture. The top portion of the cartridge body is generally separable from the rest of the body, as a cap, to facilitate insertion and removal of candles.

Use of spring loaded candles is wide spread, particularly in lamps where it is an advantage that the flame always burns at the same height. In addition, if candles of an appropriate formula are used such spring loaded candles burn for longer periods than normal candles. However, known candles for use in spring loaded cartridges do suffer from several disadvantages.

One such disadvantage is that as the candle burns a well is formed in the top of the candle, centred around the base of the wick and bounded by a raised annular rim. In the case of normal candles this does not cause a problem, but in the case of spring loaded candles the upper surface of the raised annular rim is compressed against the upper internal surface of the cartridge around the aperture in the cartridge through which the wick extends. This annular rim prevents the candle from rising within the cartridge until it gradually heats up to a temperature at which it becomes malleable. However, at this point the candle suddenly moves up quite rapidly forcing the wax from the annular rim into the well around the base of the wick under the compressive force of the spring. A molten pool of wax may be formed around the wick too quickly for it to be consumed by the burning wick and thus wax can spill out of the cartridge through the aperture or extinguish the flame entirely. This problem occurs particularly with larger diameter candles.

Another problem experienced with conventional cartridge candles is that molten wax can run down the side of the candle which when hardened can make it difficult to remove an old candle, or insert a new candle without first having to clean the cartridge out. This is particularly a problem when a candle reaches its end and most of the remaining wax is melted and which may then run down the inside of the cartridge. As the wax hardens it can cause the spring and cartridge cap to stick, making it difficult for the cartridge to be opened.

The problem of dripping wax has been addressed in relation to normal candles by the provision of "candle followers" which sit around the candle providing a receptacle to catch drips. Such candle followers sit about the top of the candle and "follow" the flame down under gravity as the candle burns. Known candle followers which are typically constructed from glass, are not suitable for use in spring loaded cartridges.

In addition, in an attempt to reduce the cleaning problems associated with residue candle wax in candle sticks, and also to reduce fire hazards, candles have been developed which are designed to self extinguish before all the wax is melted. In one such candle a short length of the bottom end of the wick is impregnated with a non-flammable chemical, and in another the bottom of the wick is pinched in an aluminium sheath. However, if used in a spring loaded cartridge as such a candle nears its end the wax around the bottom of the wick can soften to such an extent that the wick may fall over and the candle continue to burn, melting remaining wax and resulting in spillage of melted wax. Also, even if the end of the wick remains upright, heat softened wax can be extruded over the non-flammable portion of the wick under the force of the spring so that the candle continues to burn and melt the remaining wax.

It is an object of the present invention to obviate or mitigate the above disadvantages.

According to a first aspect of the present invention there is provided a cap for a candle adapted for use in combination with a spring loaded candle cartridge, the candle cap comprising a generally cylindrical body defining top and bottom apertures, and an internal annular flange extending radially inwards of the body between the top and bottom apertures, the cap being dimensioned relative to a candle with which it is

intended to be used so that in use the cap may be fitted over the top of the candle such that the annular flange seats on a top surface of the candle with the wick extending through the annular flange.

The flange is preferably provided with one or more (typically three or four) slots extending radially from the innermost edge of the flange.

The cap is preferably a "loose" fit on the candle such that in use the cap offers minimal resistance to movement of the candle up through a cartridge.

The flange may be fabricated from any suitable material, including a plastics material, but preferably at least a portion of the flange comprises a conductive material which in use disipates heat energy absorbed from the candle flame. This prevents heat becoming concentrated and thus prevents wax immediately below the flange from melting and causing pooling. The flange could for example be fabricated from a metal.

Preferably at least a portion of the upper surface of the flange comprises a reflective material which in use reflects heat energy (and preferably a substantial amount of the heat energy) radiated by the candle flame. This also prevents the wax immediately below the flange from melting and forming a pool which might either snuff out the flame or cause spillage. The flange could for example be fabricated from a metal with a polished surface, such as polished aluminium.

The diameter of the top aperture of the cap is preferably relatively large compared with the internal diameter of the annular flange to allow reflected heat radiation to escape from the cap.

The internal diameter of the annular flange is preferably sufficiently large to expose a portion of wax surrounding the wick to be melted by the heat of the flame to feed the wick.

An upper portion of the cap body above the flange may be inwardly tapered such that the top aperture has a smaller diameter than the bottom aperture.

Preferably at least the reflective portion of the upper surface of the flange is fabricated from a reflective metal foil.

Preferably the flange is fabricated from a metal foil.

The flange and cap body may be formed as separable components. For instance the cap body may be fabricated from thin plastics material (for example by a

vacuum forming process) and the flange could be a metal thin foil "washer". Such a cap may be very lightweight (too lightweight for instance to function as a standard candle follower).

In a preferred embodiment the cap body is provided with an outer radially extending circumferential lip which in use forms a seal with the cartridge. The lip may for instance be provided at the bottom edge of the cap.

Accordingly to a second aspect of the present invention there is provided a candle fitted with a candle cap in accordance with the first aspect of the invention.

The candle may be formed such that prior to initial burning the candle body comprises an upper reduced diameter portion surrounded by an annular shoulder, the cap being fitted over the top of the candle such that the annular flange of the cap seats on said shoulder around said reduced diameter portion of the candle body.

In a preferred embodiment the candle is wrapped in a thin plastics film which overlaps at least a part of the cap thereby holding the cap in position on the candle, and wherein in use as the candle burns the plastics film forms a collapsible container for containing the candle body as it is consumed.

Preferably the candle is provided with self-extinguishing means for ensuring the candle flame extinguishers before all wax has been consumed.

According to a third aspect of the present invention there is provided a combination of a spring loaded candle cartridge and a candle and cap in accordance with the first and second aspect of the invention.

Preferably the cap body is shaped to conform to the inner shape of the candle cartridge top.

A specific embodiment of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Fig. 1 is a perspective illustration of a candle cap in accordance with one embodiment of the present invention;

Fig. 2 is a longitudinal cross-section of a candle fitted with the candle cap of Fig. 1 in accordance with the present invention;

Fig. 3 is a longitudinal cross-section showing the candle and cap of Fig. 2 fitted in a spring loaded candle cartridge prior to initial lighting;

Fig. 4 illustrates the candle and cartridge of Fig. 3 after partial burning of the candle;

Fig. 5 shows the candle and cartridge of Figs. 3 and 4 after the candle has self extinguished; and

Fig. 6 shows a modification of a part of the candle cap of Fig. 1.

Referring to the drawings, and in particular to Fig. 1, the candle cap in accordance with the present invention comprises a generally cylindrical body having a lower cylindrical portion 1 and an upper tapered portion 2. The body portion 1 defines a lower opening 3 and the tapered body portion 2 defines an upper opening 4 which is smaller in diameter than the lower opening 3. The rim of the lower body portion 1 terminates in a radially outward extending circumferential lip 5. The cap body may conveniently be fabricated from a thin flexible plastics material, for instance by a process of vacuum forming.

The cap body supports an internal annular flange 6 which extends radially inwards from the region of the body between lower body portion 1 and the tapered body 2 portion 2. The annular flange 6 has a central aperture 7 which is smaller in diameter than the upper opening 4 of the cap body. In the illustrated embodiment, the flange 6 is fabricated from a reflective metal foil (i.e. is a foil "washer") and is separable from the cap body. (The separable flange 6 has an outer diameter corresponding to the internal diameter of the lower body portion 1 and may be maintained in position simply by jamming it within the cap body, retaining tension being provided by the resilience of the materials).

The particular cap illustrated in Fig. 1 is designed for use with a candle 8 and spring loaded cartridge 9 illustrated in Figs. 2 to 5. The candle 8 comprises a cylindrical wax body 10 which supports a wick 11 (which extends along the axis of the body 10 and emerges from its upper end). The upper end of the candle 8 is formed with a reduced diameter central portion 12 from which the wick 11 extends, and which is surrounded by an annular shoulder 13 defined by the upper surface of the candle body 10. A short length of the bottom of the wick 11 is enclosed within a short and relatively small diameter plastics tube 14. The plastic tube 14 is non-flammable and has a very low thermal conductivity. The bottom of the candle body 10 is supported on a thin card base 15.

The candle cap in accordance with the present invention sits loosely on top of the candle body 10, with the flange 6 seated on the annular shoulder 13 such that the reduced diameter portion 12 of the candle 8 passes through the flange aperture 7.

The candle body 10, base 15, and candle cap are wrapped in a thin film 16 of plastics material (for instance by a "shrink-wrapping" process). The plastics film wraps around the base 15 of the candle 8 and terminates part way along the tapered portion 2 of the cap body. The plastics film 16 thus serves both to encase the candle body 10 and also to hold the candle cap in position (the cap being only a loose fit around the top of the candle 8).

Referring now to Figs. 3 to 5, the spring loaded cartridge 9 comprises a hollow cylindrical metal body 17 which has open top and bottom ends. The bottom end of the cartridge body 17 defines a radially inwardly extending annular flange 18 which provides a seating for one end of a coil spring 19. The opposite end of the coil spring 19 supports a circular metal platform 20 of a diameter substantially equal to the internal diameter of the cartridge body 17. The top end of the cartridge body 17 is closed by a removable cap 21 which slides over the upper end of the body 17. To secure the cap 21 to the body 17 the cap 21 is provided with an inverted L shaped slot 22, the horizontal portion of which is slightly indented, which receives a stud 23 supported by the body 17. The upper end of the cap 21 tapers towards a central opening 24 which has a diameter less than that of the cartridge body 17 and the candle body 10. Candle cartridges of this type are well known.

In use, the candle 8 is inserted through the upper end of the cartridge body 17, with the cartridge cap 21 removed, and forced inwards against the action of the spring 19 so that it is seated on the platform 20. The cartridge cap 21 is then replaced over the upper end of the cartridge body 17 to retain the candle 8 within the cartridge (the candle cap being "trapped" between the candle 8 and the cartridge cap 21). As well as being shaped to suite the candle 8, the candle cap is also dimensioned to suite the configuration of the cartridge. Thus, the diameter of the cylindrical portion 1 of the candle cap body corresponds to the internal diameter of the cartridge cap 21, and the tapered portion 2 of the candle cap body corresponds in shape to the taper of the cartridge cap 21. In addition, the candle 8 is dimensioned so that it is a relatively loose fit within the cartridge. Making the candle body 11 a loose fit within both the

cartridge body 17 and the candle cap helps ensure that movement of the candle up through the cartridge 9 is progressive.

As can be seen from Fig. 3, before the candle 8 is first lit, the reduced diameter central portion 12 of the candle 8 protrudes through the opening 24 in the cartridge cap 21. A cavity 25 is formed within the tapered portion 2 of the candle cap between the upper surface of the flange 6 and the opening 24.

The length of the wick 11 and candle portion 12 extending from the opening 24 is just sufficient to enable the candle 8 to be properly lit. By ensuring that a minimal amount of the candle extends through the opening 24 in that period before the wick 2 burns down to the level of the opening 24 the possibility of melted wax dripping down the outside of the cartridge cap 21 is substantially reduced.

Fig. 4 illustrates the configuration once the candle has been partially consumed and the wax of the candle portion 12 is burnt away. As it burns, the candle 8 is continually forced up the cartridge 9 by the action of the spring 19. However, the flange 6 is strong enough to prevent the candle from being extruded up through the openings 4 and 24 in the candle cap and cartridge cap 21 respectively. This also ensures that the base of the exposed wick 10 is always below the level of the opening 24 in the cartridge cap 21 so that any molten wax around the wick is unlikely to be spilt from the cartridge 9.

In addition, the metal foil flange 6 reflects a substantial portion of the heat energy produced by the candle flame. Moreover because the foil flange 6 is conductive and any heat energy absorbed by the flange is dissipated over a large surface area, and not concentrated in any particular area. The wax immediately below the flange 6 therefore remains relatively cool. The overall effect is to prevent wax melting more quickly than it can be consumed which could otherwise result in a relatively large pool of wax forming which might either spill from the opening 24 in the cartridge cap 21 or snuff out the flame.

The flange 6 also prevents the build up of an annular rim of wax around the edge of the candle 8, and this, in combination with the candle being a loose fit within the candle cap, ensures that movement of the candle up through the cartridge is progressive (there being no sudden "jump" in the movement of the candle as the rim collapses as occurs with the prior art). As the candle burns a shallow well may be

formed around the wick 11 in the area defined by the flange aperture 7, but this is not sufficient to cause problems.

As the candle body 10 melts and burns the candle cap prevents softened or molten wax contacting and hardening on the inner surface of the cartridge cap 21. Should any wax be spilt between the candle cap and the cartridge cap 21 (which is unlikely given the close fit between the two) it will be prevented from dripping down the length of the cartridge by the outer lip 5 of the candle cap which forms an effective seal with the cartridge cap 21.

Furthermore, as the candle 8 burns down, and the candle body 10 moves up through the cartridge, the plastics wrapping 16 which overlaps the candle cap will continue to contain the candle body 10. That is, the wrapping 16 essentially provides a collapsible container such that the candle body 10 is at all times encased within the wrapping 16 and isolated from the cartridge 9.

The candle will continue to burn in this manner until the flame reaches the non-flammable plastics tube 14. Subject to the ambient conditions within the candle, and the dimensions of the tube 14, the candle will then extinguish in one of two ways. Either the flame will continue to burn until it has exhausted the supply of liquid wax within the tube 14 or the flame will be snuffed out before consuming the wax in the tube 14 by lack of air supply to the base of the flame. In either case the flame will extinguish leaving a solid slug of wax which will be encased by the candle cap and the plastics wrapping 16 (which wraps around the card base disc 15). Since the flange 6 keeps wax below the flange relatively cool, wax will not be melted and extruded over the tube 14 to be consumed by the flame, and similarly will not be extruded out of the candle cap. The result is a neat solid slug of wax wrapped in the plastic film 16 which can readily be removed from the candle without leaving a wax residue in the cartridge.

A modification to the flange 6 (which may be incorporated in the illustrated cap) is illustrated in Fig. 6. The modified flange 25 is again fabricated from a metal foil but is modified in two independent ways: firstly it is dished (i.e. conical), to encourage centralised extrusion of the candle wax around the wick (a candle is shown in chain-dot in Fig.6), and secondly it is provided with three slots 26 which extend inwardly from the inner aperture of the flange 25. The latter modification is particularly significant. It has been found that with some candle/cartridge

combinations a sudden release of melted wax can occasionally occur when a point is reached at which the spring pressure overcomes friction between the candle wax and the retaining surface or surfaces. In some conditions, generally when there is a high ambient temperature, this sudden release of melted wax through the centre aperture of the flange 6 has been observed to cause the flame to extinguish. Tests have shown that this problem is eliminated by the provision of the slots 26. There are thought to be two factors which contribute to the effectiveness of the slots 26 in combating this problem. Firstly, the slots allow a certain "overflow" of the melted wax to flood away from the flame and thus not choke the wick. Secondly, it is thought that the slots allow heat within the wax to disperse so that the wax below the flange remains relatively cooler and therefore more solid, than it would if the slots were not present. The slots 26 do not, however, have any detrimental effect on the ability of the flange 25 to act as a retainer for the mass of the candle preventing the candle from being forced upwards through the cap and cartridge.

Although the illustrated embodiment of the modified washer is shown to have three slots 26, it will be appreciated that more or less slots could be included. For instance a single slot may have a beneficial effect. Similarly, more than three slots could be provided, for instance four slots could be provided at equal spaced locations around the circumference of the flange 25. Furthermore, the size (both width and length) of the slots may be varied from that illustrated.

It will be appreciated that the dished shape of the flange 25 is to accommodate a particular shape of candle and could be varied to suit other candle shapes. Similarly, it would be appreciated that if the candle has a substantially flat shoulder 13 as shown in Figs. 2 to 5, the flat flange 6 may be modified by a provision of slots as described above.

It will be appreciated that although the above described embodiment of the invention includes a number of advantageous features, the candle cap alone could be used to advantageous effect without, for instance, the plastic wrapping 16 or the self extinguishing feature.

It will also be appreciated that many modifications may be made to the detail of the candle cap described above. For instance, the body of the cap could be made from any suitable alternative material, such as a metal foil. Similarly the flange could

be made from alternative materials such as a plastics material provided with a reflective surface coating. The body and flange could be formed from the same material and be constructed as a single component rather than being separable. The exact shape of the cap can be varied to suit different candles and cartridges.

Other possible modifications will be readily apparent to the appropriately skilled person.

CLAIMS

1. A cap for a candle adapted for use in combination with a spring loaded candle cartridge, the candle cap comprising a generally cylindrical body defining top and bottom apertures, and an internal annular flange extending radially inwards of the body between the top and bottom apertures, the cap being dimensioned relative to a candle with which it is intended to be used so that in use the cap may be fitted over the top of the candle such that the annular flange seats on a top surface of the candle with the wick extending through the annular flange.

2. A candle cap according to claim 1, wherein said annular flange is provided with one or more slots extending radially from the radially innermost edge of the flange.

3. A candle cap according to claim 1 or claim 2, wherein at least a portion of the flange comprises a conductive material.

4. A candle cap according to any preceding claim, wherein the flange is fabricated from a metal foil.

5. A candle cap according to any preceding claim, wherein at least a portion of the upper surface of the flange comprises a reflective material which in use reflects heat energy radiated by the candle flame.

6. A candle cap according to claim 5, wherein the flange is fabricated from aluminium.

7. A candle cap according to any preceding claim, wherein the diameter of the top aperture of the cap is relatively large compared with the internal diameter of the annular flange to allow reflected heat radiation to escape from the cap.

8. A candle cap according to any preceding claim, wherein the internal diameter of the annular flange is sufficiently large to expose a portion of wax surrounding the wick to be melted by the heat of the flame to feed the wick.

9. A candle cap according to any preceding claim, wherein an upper portion of the cap body above the flange is inwardly tapered such that the top aperture has a smaller diameter than the bottom aperture.

10. A candle cap according to any preceding claim, wherein at least the reflective portion of the upper surface of the flange is fabricated from a reflective metal foil.

11. A candle cap according to any preceding claim, wherein the flange and cap body are separable components.

12. A candle cap according to claim 11, wherein the cap body is fabricated from a plastics material.

13. A candle cap according to any preceding claim, wherein the body is provided with an outer radially extending circumferential lip.

14. A candle fitted with a candle cap according to any preceding claim.

15. A candle and cap combination according to claim 14, wherein prior to initial burning the candle body comprises an upper reduced diameter portion surrounded by an annular shoulder, the cap being fitted over the top of the candle such that the annular flange of the cap seats on said shoulder around said reduced diameter portion of the candle body.

16. A candle and cap combination according to claim 14 or claim 15, wherein the candle is wrapped in a thin plastics film which overlaps at least a part of the cap thereby holding the cap in position on the candle, and wherein in use as the candle

burns the plastics film forms a collapsible container for containing the candle body as it is consumed.

17. A candle and cap combination according to any one of claims 14 to 16, wherein the candle is provided with self-extinguishing means for ensuring the candle flame extinguishers before all wax has been consumed.

18. A combination of a spring loaded candle cartridge and a candle and cap in accordance with any preceding claim.

19. The combination of claim 18, wherein the upper portion of the cap body is shaped to conform to the inner shape of the candle cartridge top.

20. The combination according to claim 18 or 19, wherein the external lip provided on the candle cap body forms a seal with the inner wall of the cartridge preventing wax from dripping down the cartridge.

21. A cap for a candle, substantially as hereinbefore described, with reference to the accompanying drawings.

22. A candle and candle cap combination, substantially as hereinbefore described, with reference to the accompanying drawings.

23. A combination of a spring loaded candle cartridge and a candle fitted with a candle cap, substantially as hereinbefore described, with reference to the accompanying drawings.

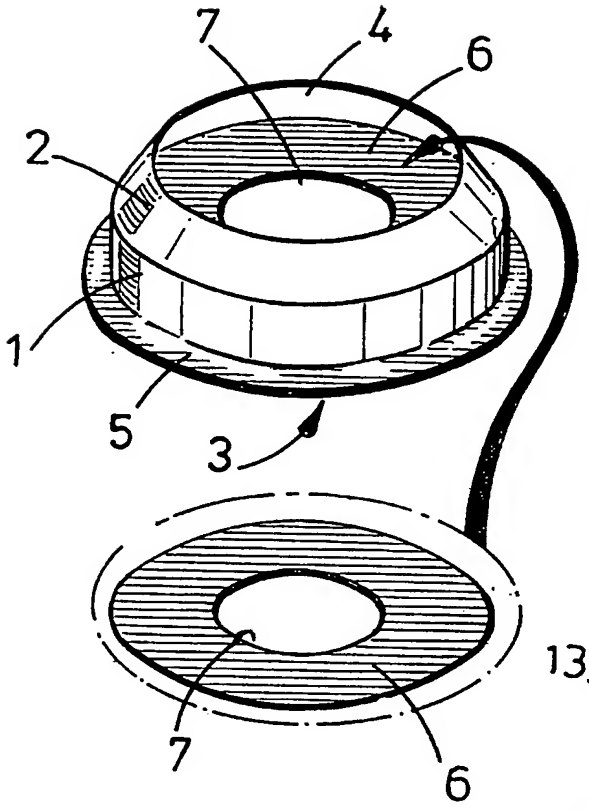

FIG. 1

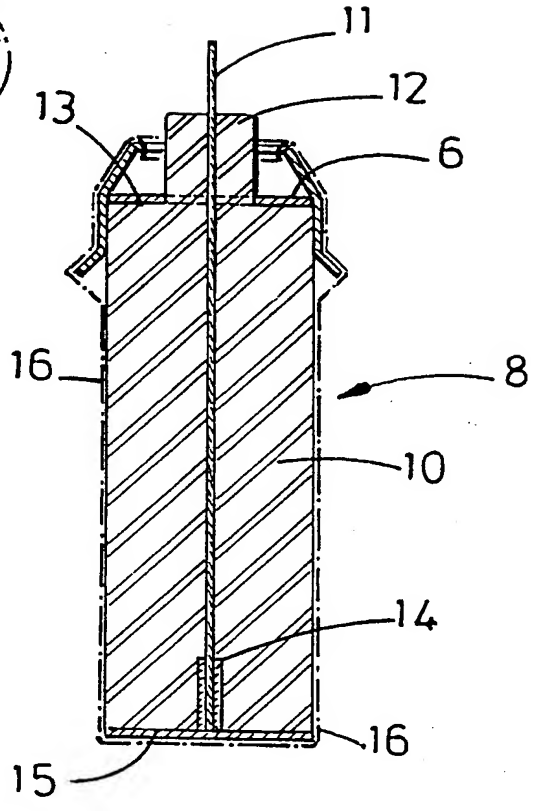

FIG. 2

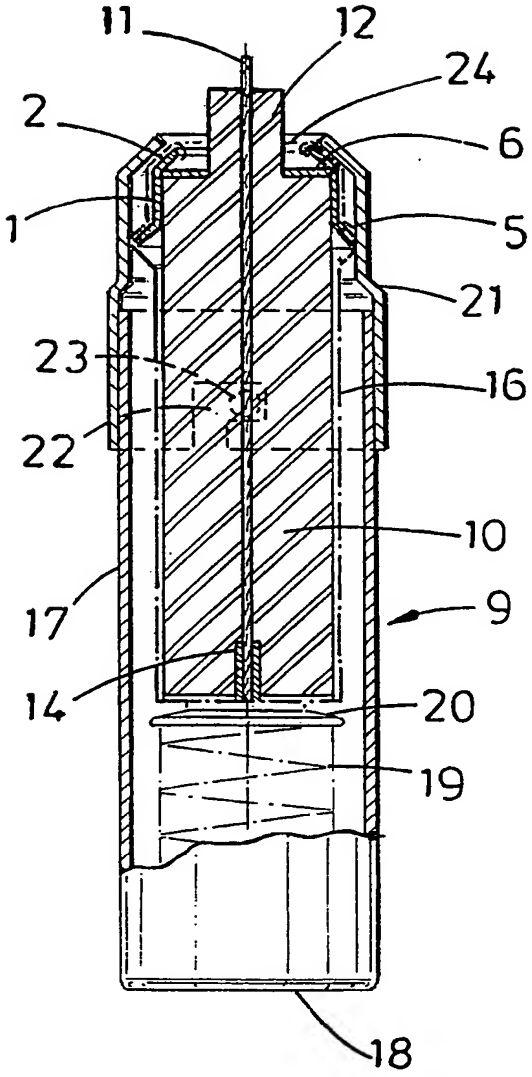

FIG. 3

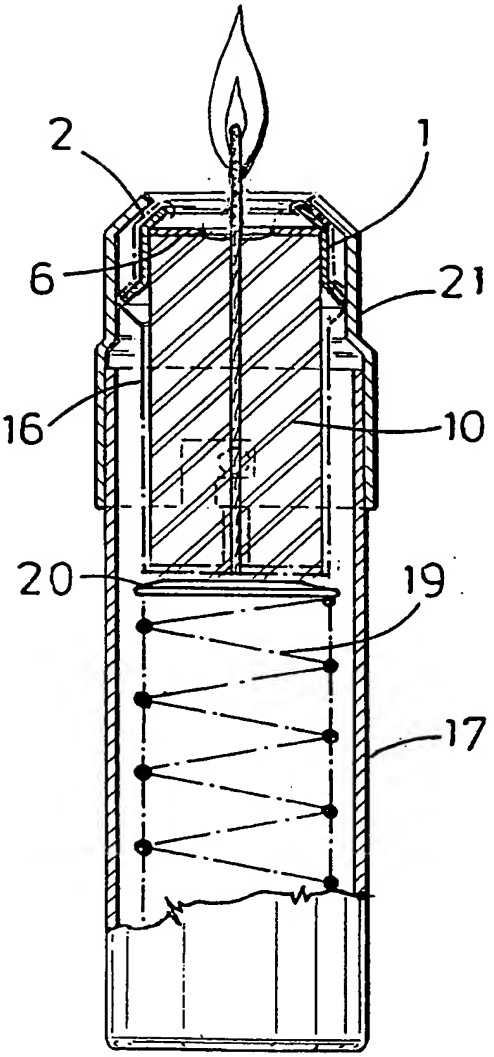

FIG. 4

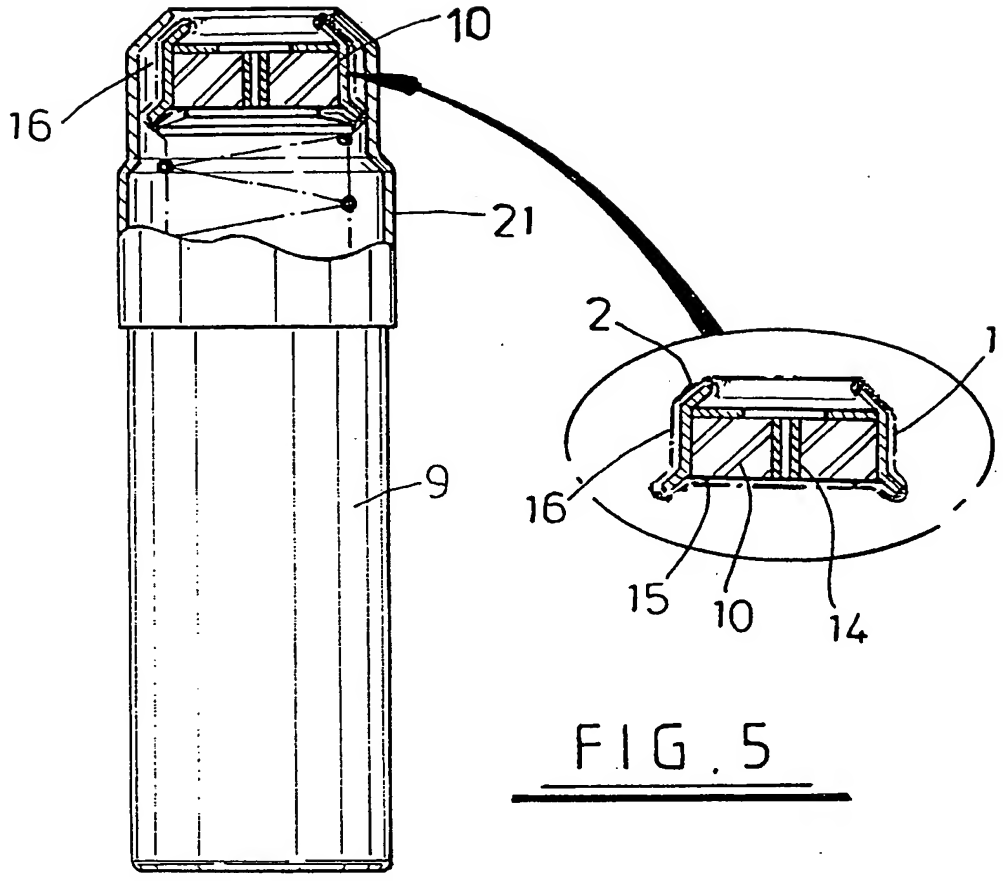

FIG. 5

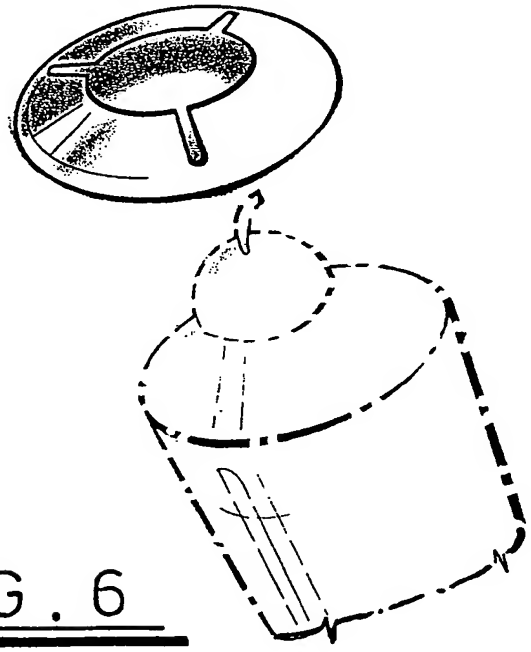

FIG. 6

INTERNATIONAL SEARCH REPORT

	National Application No PCT/GB 98/02956

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 F21V35/00 F21S13/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 F21V F21S

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	GB 2 175 994 A (KWOK WAI SHI) 10 December 1986 see page 2, line 10 - line 101 see page 3, line 19 - line 28 see figures 1-3	1-4,8, 14,18, 19,21-23 10,11, 16,20

X	US 2 680 963 A (CHURCHILL RALPH H) 15 June 1954 see column 2, line 15 - line 45 see column 3, line 8 - line 54 see figures 2,4	1,8,14, 18,19, 21-23

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

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Date of the actual completion of the international search	Date of mailing of the international search report
21 January 1999	28/01/1999
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	**Authorized officer** Clabaut, M

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INTERNATIONAL SEARCH REPORT

	National Application No PCT/GB 98/02956

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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